

-! Aggregates :-

Properties of the aggregates like its shape and texture affects the characteristics of the mixture prepared from it.

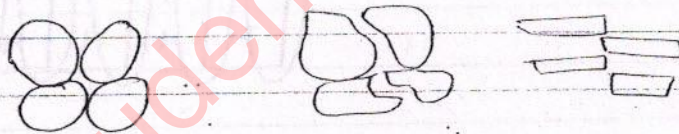
(i) Aggregates are generally found to have round, angular or flakey shape.

Round shape Agg.^{tes} results in formation of highly workable mixture, due to its min^m surface area over which lubrication is to be provided by cement paste.

(ii) Angular aggregates results in formation of high strength of mixture due to stronger interparticle bonding and higher bond strength, available due to more surface area.

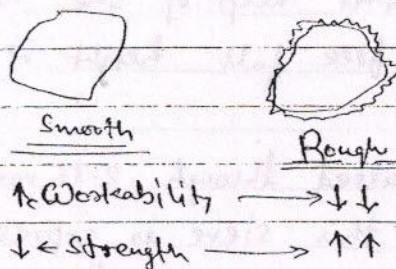
Available

(iii) Flakey Agg. results in formatⁿ of poor mixture which neither possesses workability nor strength.



Angularity of Aggre. is measured in terms of the parameter Angularity No., represents the %age of the voids present in the Aggregates. If %age Voids is 33% Angularity No. is taken to be 0 and if 44%, Angularity No. is to be taken 11.

→ Smooth textured Agg. results in formatⁿ of highly workable mixture but rough agg. impart more strength to the mixture. due to higher availability of surface area.



Testing of Agg. :-

(A) Agg. Crushing Value Test :- This test is performed in order to find the compressive strength of the agg^s. this test is performed on single size agg. passing through 12.5 mm sieve, and retained over 10 mm size sieve. that is further subjected to gradual loading of 40 tonnes, and the crushed agg^s are passed through 2.36 mm sieve. The wt. of these agg^s passing through this sieve is expressed as the %age of Original wt. of agg^s. is termed as agg. Crushing Value.

(i) For Concrete to be used in permanent construction should not be greater than 30. And for any other type of constr. is should 40.

(B) Aggregate Impact Value Test :- This test is performed to find the toughness of the aggs.

- (i) In this test aggs are placed in a mould and subjected to 15 No. of blows with help of the hammer having the total wt. of 14 kg and free fall height of 38 cm.

(ii) The aggs are further passed through 2.36 mm sieve. The wt. of the aggs passing through this sieve is expressed as the %age of Original wt. of Aggs is termed as "Agg. Impact Value".

(iii) For concrete to be Used in "Pavement Construction"

Agg. Impact Value ≤ 30

→ Any other type of Constructn

Agg. I. Value ≤ 45

(C) Aggs. Abrasion Value test :- This test is performed to find the hardness or resistance against the wear and tear of Aggs.

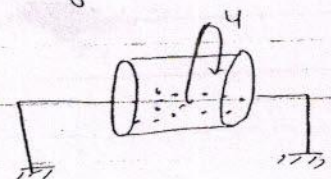
- (i) In this test Aggs are ~~worn~~ ^{beaten} in Iron cylinder that is rotated at a particular speed causing the abrasion of the aggs. which are further passed through 1.7 mm sieve. and the wt. of the aggs passing through the sieve expressed as the %age of the original wt. of Aggs. is termed as "Aggs Abrasion Value".

(ii) For the Aggs to be used in construction of the "Pavement"

Aggs Abrasion Value ≤ 30

→ "Other type of Constructn"

Aggs Abr. Value ≤ 50



(D) Fineness Modulus Test :- It is the ready index of coarseness and fineness of the Agg^s.

(i) It is defined as the summation of cumulative %age of Agg^s retained over diff^{nt} sieve ranging from 150 μ to 80 mm divided by a constant factor that is generally taken to be 100.

Sieve Size	wt. Retained	% wt. Retained	Cumulative
80	5	5	5
40	15	15	20
20	21	21	41
10	7	7	48
4.75	12	12	60
2.36	25	25	85
1.18 mm	15	15	100
600 μ	0	0	100
300 μ	0	0	100
150 μ	0	0	100

$$\Sigma_{sum} = 659$$

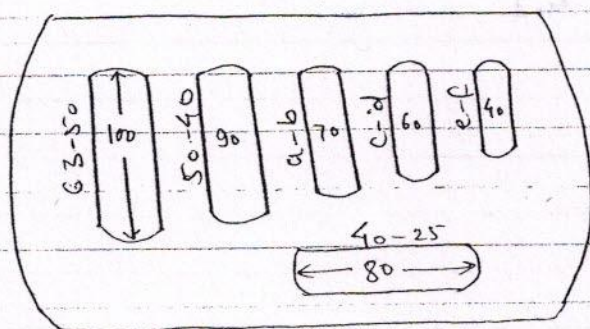
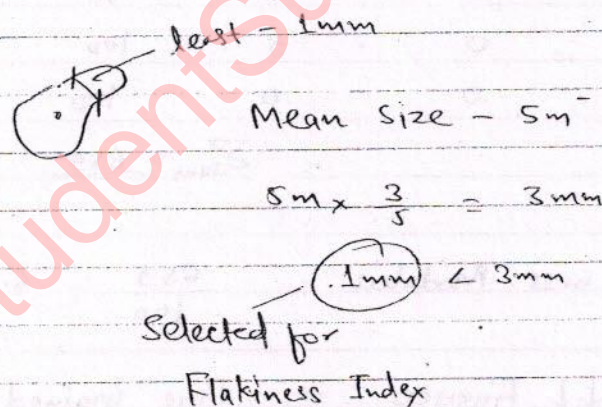
$$\text{Fineness Modulus} = \frac{659}{100} = 6.59$$

↓↓ Fineness Mod. → Fine Grained Soil.

↑↑ Fineness Mod. → Coarse Grained Soil.

(E) Flakiness Index Test :- Flakiness Index of Agg^s is the %age of the particles present in it having their least size smaller than $\frac{3}{5}$ th of their mean size. This test is not valid for the Agg^s having size smaller than 6.3mm.

- (i) In order to perform this test, sufficient $\frac{4n}{100}$ of Agg^s is taken such that 200 pieces of each fraction can be tested.
- (ii) This test can be performed with help of Metal thickness gauge which consist of no. of opening through which Agg^s of diff^t fractions are passed piece by piece. and wt. of Agg^s passing through all the opening expressed as the %age of original wt. of agg^s is termed as flakiness Index.



(F) Elongation Index Test :- Elongatⁿ Index of Agg^s is the % age of particles present in it having it's greatest size larger than 1.8 times of it's mean size. This test is not applicable for agg^s having size less than 0.6mm.

- (i) In order to perform this test sufficient agg^s are taken such that 200 pieces of each fraction can be test.
- (ii) This test is performed with the help of length gauge which consist of no. of openings through which agg^s of each fraction are passed piece by piece and the wt. of the agg^s retained on diff^t openings expressed as the % age of the Original wt. of Agg^s. is termed as Elongatⁿ Index.

